



Alligator Rivers NT01.02.03

Regional Setting

The dominant regional processes influencing coastal geomorphology in this region are the wet-dry tropical climate, trade winds, monsoons, mega to meso (limited) tides, semi-diurnal, waves dominantly seas, episodic high river sediment discharges, mixed carbonate – terrigenous sediments, tidal sediment transport, limited longshore transport, the El Nino Southern Oscillation (driving high sea-level variability), and the Madden-Julian Oscillation (driving weather patterns including monsoons and tropical cyclones).

Regional hazards or processes driving large scale rapid coastal changes include: tropical cyclones, storm surges, king tides and river flooding.

This compartment extends from Point Stuart to Point Farewell.

Justification of sensitivity

Sensitivity rating is a 3 overall, although ratings to vary. Some areas might be considered a 2 where progradation will occur. Local ratings of 4 are also given to certain areas, particularly paleochannels, which are likely to be vulnerable to inundation and saline intrusion.

Other comments

This compartment is dominated by the mouths of four tidal rivers: the Wildman, West Alligator, South Alligator and East Alligator Rivers. The estuarine plains flanking these rivers have filled in to different extents and have fringing mangrove forests. Each river is highly seasonal, with a fully-mixed tidal system extending progressively more upstream in the dry season, and a fluviially-dominated river inundating the adjacent plains during the wet season. Waters are highly turbid, with tidal



resuspension of muddy sediments (a lutocline) meaning large volumes of mud are moved. The rivers are highly meandering with both the South and East Alligator Rivers containing sections of cusped meanders in their upper reaches. Saline intrusion, characterised by saltwater extending landwards through networks of small creeks, is locally a problem on several of the systems.

Confidence in sources

Medium confidence: A historic pattern of tidal creek expansion has been documented, but longer-term vulnerability of adjacent low-lying plains is not well understood.

Additional information (links and references)

- *An inventory of all the beaches in northern Australia has been compiled by Short (2006). This provides details of the geomorphology of each beach and other information that will be useful in determining the functioning of tertiary compartments:*
Short, A.D., 2006. Beaches of the northern Australian coast: the Kimberley, Northern Territory & Cape York. Sydney University Press.
- *There has been little comprehensive study of the coast of the Northern Territory. There is little information on the offshore characteristics of NT. A workshop was held in 2007 that summarised the nature of the offshore environment, recognising Joseph Bonaparte Gulf in the west, Arafura in the north, and the Gulf of Carpentaria in the east. The report is available at www.environment.gov.au/system/.../characterisation-workshop-report.rtf*



- Assessment of predicted climate change and sea level rise in the Alligator Rivers Region, Northern Territory, Australia. Supervising Scientist Report. No.123.
- Cobb, S.M., Saynor, M.J., Eliot, M., Eliot, I., Hall, R., 2007. Saltwater intrusion and mangrove encroachment of coastal wetlands in the Alligator Rivers Region, Northern Territory, Australia, Supervising Scientist Report. Supervising Scientist, Darwin NT.
- Eliot, I., Flinlayson, C.M., Waterman, P., 1999. Predicted climate change, sea-level rise and wetland management in the Australian wet-dry tropics. *Wetlands Ecology and Management* 7, 63-81.
- Winn, K.O., Saynor, M.J., Eliot, M.J., Eliot, I., 2006. Saltwater intrusion and morphological change at the mouth of the East Alligator River, Northern Territory. *Journal of Coastal Research* 22, 137-149.
- Wolanski, E., Chappell, J., 1996. The response of tropical Australian estuaries to a sea level rise. *Journal of Marine Systems* 7, 267-279.
- Woodroffe, C.D., Chappell, J., Thom, B.G., Wallensky, E., 1986. Geomorphological dynamics and evolution of the South Alligator River and plains, N.T. North Australia Research Unit Monograph, ANU Press.
- Woodroffe, C.D., Mulrennan, M.E., Chappell, J., 1993. Estuarine infill and coastal progradation, southern van Diemen Gulf, northern Australia. *Sedimentary Geology* 83, 257-275.